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1. I A Oding and M G Lozinskiy: Methods of Studying the Structure of Metals and Alloys at High Temperatures. Vestnik Mashinostroyeniya 34 (1954) no. 1, pp 52/61

A. Laboratory technique. A discussion of the basic principles of the investigation of the structure of metals and alloys at elevated temperatures, and a detailed description of the various types of equipment used by the authors. Three basic methods are used:
   1.) room-temperature study of the structure of specimens heated and cooled in vacuum (the structure is developed by differential evaporation between the grain boundaries and the grains during vacuum heating);
   2.) direct observation of the specimens in the vacuum chamber during heating and cooling;
   3.) room-temperature study of specimens heated in vacuum and oxidized by brief introduction of air.

B. Seven examples are given:

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1.) ten photomicrographs showing the changes occurring in an unalloyed medium-carbon steel during heating to temperatures from 1000 to 1340 C, and during cooling from these temperatures;
2.) two photomicrographs of tungsten wire containing 0.05% Al, heated to 1450 and 3000 C;
3.) four photomicrographs showing the changes taking place in gray cast iron heated to 1100 C;
4.) two photomicrographs (one bright and one dark field) of steel [illegible] heated to 1200 C;
5.) two photomicrographs (one at 2000 X) of chromium-molybdenum-nickel steel heated to 1200 C;
6.) two photomicrographs showing selective oxidation of pure nickel heated in vacuum to 1100 C (one in color);
7.) two color photomicrographs, one of "Armco" iron and one of a high-alloy cast chromium-molybdenum alloy, showing the structure formed on heating to 1100 C.

A wide development of high-temperature microscopy for both research and industrial purposes is predicted.

C. Some of the black-and-white photomicrographs are quite good. The color reproduction of two of the three color photomicrographs is not particularly good.

D. A competent paper that offers nothing basically new from the standpoint of laboratory procedure.

E. As Oding and Lozinskiy point out, high-temperature microscopy is not new. All the modifications discussed have been known for some time. Such laboratory procedures have not as yet produced any startling information that could not have been obtained by other and simpler means; for example, by regular room-temperature microscopic study of samples heated and cooled in the ordinary way. It is certainly possible, however, that high-temperature microscopy might contribute worth-while information in the future. It is not clear what Oding and Lozinskiy have in mind in predicting the use of high-temperature microscopy in industry. Presumably it could be used directly only if the parts were subjected in service to heating in vacuum. Perhaps they have in mind the indirect use to determine differences in behavior of metals and alloys used at elevated temperatures. In that case, however, it would have to be assumed that the change in structure would be the same on heating in vacuum as in service. This is by no means certain. At high temperatures the absorption by metals and alloys of elements such as carbon, nitrogen and sulfur from the surrounding atmosphere is known to change the structure and properties. Such changes would naturally not be observed on vacuum heating.

F. No details are given on potential or actual uses for any of the materials investigated. The small aluminum addition to the tungsten wire is rather interesting. It is possible that it may be intended to inhibit grain growth or to minimize sagging.

G. Five of the 21 references are to non-Soviet magazines. An innovation for Soviet technical magazines is the transliteration of the authors' names of these foreign references. (Magazine names are not transliterated.)

2. I V Kudryavtsev and N M Savvina: Effectiveness of Surface Strengthening Parts with Transverse Holes. Vestnik Mashinostroyeniya 34 (1954) no. 1, pp 61/65

A. Practical. Many fatigue failures start at keyways and oil holes. To clarify the effect of superficial cold work on this type of failure, bending and torsion fatigue tests were made on round and flat bars with transverse holes having different diameters. Three carbon steels (0.17, 0.[illegible] and 0.[illegible]) in various conditions of heat treatment were used.

1.) In all cases, superficial cold working improve[illegible]
2.) The ratio of hole diameter to specimen diameter [illegible] fatigue life.
3.) Tempering after cold working not only removed [illegible]

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effect but also gave fatigue strengths lower than those of the untreated specimens.
4.) Cold working the specimen after drilling the transverse hole was considerably more effective in respect to fatigue strength than cold working before drilling.
5.) On the basis of these results, superficial cold working is recommended for steel parts having transverse holes or other design features that give analogous stress concentration.

The beneficial effect of cold working is considered to be the result of two factors: superficial strengthening, which increases fatigue strength, and development of more favorable residual stresses, which has the same effect.

B. An adequate paper that presents nothing new. It has long been known that design features such as keyways and oil holes are stress raisers that will lower fatigue strength. It has been known for almost as long that various methods - of which superficial cold working is one - can be used to overcome this unfavorable stress pattern. Battelle Memorial Institute in 1941 summarized some of the earlier work in this field. One of the simpler methods of overcoming the deleterious effects of transverse oil holes is to stamp or press stress-relieving notches around the hole, as covered by Battelle and Horger. This latter method also appears to have advantages when the oil holes involved are small enough to offer difficulties in cold working them.

Battelle Memorial Institute: Prevention of the Failure of Metals under Repeated Stress. New York (1941)
O J Horger: Stressing Axles and Other Railroad Equipment By Cold Rolling. Surface Stressing of Metals. ASM (1947) pp 85/142

3. N A Karasev: Effect of Shot Peening on the Repeated-Impact Strength of Steel. Vestnik Mashinostroyeniya 34 (1954) no. 1, pp 66/68

A. Practical. The use of shot peening to improve the surface strength of metals is well known. Its application to raise the repeated-impact strength is appreciably less known. Tests were therefore conducted on two carburizing steels (18KhGT and 30KhGT) as well as on a high-carbon steel (60S2).
1.) Shot peening increased the repeated-impact strength in all cases.
2.) The greatest improvement was found with carburized specimens.
3.) The optimum degree of shot peening depends on various factors including the initial hardness of the steel.
4.) Shot peening is therefore an effective means of strengthening steel not only under conditions of cyclic loading but also under conditions of cyclic impact.

B. The test results appear competent but the discussion is not. Karasev appears to be under the delusion that his test measures something different from ordinary fatigue strength. As a matter of fact, the equipment sounds like the old "Dauerschlagwerk, Bauart Krupp". The only difference is minor - namely, the Krupp machine used a weight of 4.14 kg, whereas Karasev uses 5 kg. Apparently this type of machine has been little used in recent years. Mailander has indicated, however, that this type test was considered a fatigue and not an impact test. He further stated "A clear relation between the number of blows to fracture and the impact strength of steel has not been found."

R Mailander: Ermudung und Dauerfestigkeit. Werkstoff-Handbuch Stahl und Eisen D11-1 (1928)

C. As far as the steels are concerned:
1.) 60S2 is similar to AISI-SAE 9260, a widely used spring steel in the USA. Although the average manganese of 60S2 is somewhat lower, the ranges of the two grades overlap.
2.) 18KhGT is a manganese-chromium-titanium carburizing steel, which has been discussed in previous reviews. There is no equivalent USA grade.

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M P Braun and P E Voronov. High Strength Low Alloy Carburizing Steels. Stal 6 (1946) pp 181/188

A N Minkevich: Chemico-Thermal Treatment of Steel. Moscow (1950) 432 pp

3.) 30 KhGt is not mentioned in these previous references. Minkevich does discuss the carburizing of 30 KhGS, although it appears to have been done mainly on an experimental basis when his book was written. The highest carbon content in any of the regular carburizing grades in the USA is 0.25/0.30% C in AISI-SAE 4028, a grade with relatively low hardenability used almost entirely in the automotive industry. Various steels with about 0.30/0.35% C are, however, carburized here for die applications, such as carburized plastic dies. Karasev gives no indication of the use of 30 KhGT.

4. L V Golub: Electric-Arc Welding of Bronzes. Vestnik Mashinostroyeniya 34 (1954) no. 1, pp 85/86

A. Practical. Welding procedure for welding and repairing bronze parts, and for making bronze overlays on steel. Manufacture of coated bronze electrodes.

B. This type of article with complete details on electrode manufacture is rather popular in the USSR but very rare in the USA where capitalistic competition limits details on electrode production. It is not clear why such details would be of much interest to the general reader in the USSR since the electrodes are apparently made by TsNIITMASH.

C. Three grades are mentioned: A-5, A-7 and AZh-9-4. The composition is given only for the last grade, which corresponds to aluminum bronze 10% a standard wrought and cast grade in the USA. Apparently the first two materials are also aluminum bronze, presumably with 5 and 7% Al. Similar grades are available in wrought form in the USA, but aluminum-bronze electrodes here generally deposit weld metal with at least 8% Al. Therefore USA coated electrodes would correspond more closely to AZh-9-4 than to A-5 and A-7. There is no indication as to whether these aluminum bronzes are being stressed because of their good properties or because of a limited tin supply.

D. Aluminum-bronze shielded-metal-arc electrodes are used rather extensively in the USA for similar purposes to those mentioned by Golub. His welding recommendations also agree roughly with those given in the USA, although a somewhat lower preheat is usually suggested here.

E. Golub states that the best plasticity is obtained with bronzes having 2/6% Al. Presumably he is referring to the alpha bronzes here; in that case the upper limit would normally be given in the USA as 7.5 rather than 6%.

5. V S Volodin: About Misappropriation of Soviet Inventions by American Firms. Vestnik Mashinostroyeniya 34 (1954) no. 1, pp 87/89

A. Letter to the editor. Exception is taken to an item in the April 1953 Welding Journal. This item presents as a "new development" of The Lincoln Electric Co. the use of two small electrodes in place of a single larger electrode in the submerged-arc process. Volodin (who is described as the inventor of the multi-electrode arc-welding process) details the long history of this development in the USSR.

B. It is not clear whether Volodin is hurt at the lack of credit given in the USA to Soviet research, or annoyed that capitalistic companies are making a profit from Soviet developments.

C. Actually, the item in the Welding Journal merely appears under "New Products." It is not a technical article; therefore, there is no question of citation of prior work.

D. Work has been done in the USA as well as in the USSR on multi-electrode

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E. The promptness of this complaint is surprising, since often there appears to have been much greater delay before research workers in the USSR have become aware of pertinent papers in non-Soviet magazines.

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